

DN A01042



BOX Non-Final
PATENT

Attachment I:

Declaration of Eric G. Lundquist under 37 C.F.R. §§ 1.132

I, Eric G. Lundquist of 107 Churchill Circle, North Wales, Pennsylvania, declare that I am a Research Fellow employed by Rohm and Haas Company. I received a B.S. in Chemistry from The Pennsylvania State University, State College, Pennsylvania, in 1984. I was granted a Ph.D. in Inorganic Chemistry from Indiana University, Bloomington, Indiana, in 1988. My career with Rohm and Haas Company extends over 15 years, from 1988 to present. I began my career as a senior scientist, progressing to Research Fellow in 1999. I have been a researcher in the following Rohm and Haas research departments:

Ion Exchange Research

1988 to 2000

Emerging Technologies

2000 to present

While a researcher in Ion Exchange Research, I engaged in research, development, and manufacturing of porous polymers for use in catalysis and water treatment applications. In Emerging Technologies, I am engaged in research and development associated with porous carbons and polymers for energy storage and catalysis applications.

My extensive experience as a scientist in the research department (Ion Exchange) that invented and commercialized AMBERLITE™ XAD-4 and a wide range of ionic and non-ionic macroreticular resins, equips me to compare AMBERLITE™ XAD-4, used by Sanders, with the matrices of the present invention as defined in USP 09/932,865. As a result, I further declare the following:

1. AMBERLITE™ XAD-4 is a hydrophobic macroreticular resin having an average pore size of 50 Angstroms. Although AMBERLITE™ XAD-4 does contain a significant level of pendant vinyl groups (residual double bonds from the incomplete crosslinking of divinylbenzene) distributed uniformly within its porous polymer particle, most of these double bonds are inaccessible to solutions of metallic complexes even when those metallic complexes are dissolved in hydrophobic solvent. This inaccessibility is due to the small average pore size of AMBERLITE™ XAD-4, a barrier that cannot be overcome even by solvent having solubility parameters similar to those of the resin.
2. The matrix resins of the present invention have average pore sizes of ≥ 100 Angstroms. Such pores are large enough to be efficiently loaded with metallic complexes.
3. Regarding Sander's (USP 4,348,509) Illustrative Embodiment A at column 3, lines 32-42, the method of adding a 30 wt% solution of H_2PtCl_6 in water to AMBERLITE™ XAD-4 is entitled "Impregnation", yet it is in reality **nothing more than an attempt to coat the exterior surface of the AMBERLITE™ XAD-4 particles**. In my experience, hydrophobic macroreticular resins do not imbibe water when that water contains hydrophilic solutes (e.g., H_2PtCl_6). This failure to imbibe aqueous solutions of hydrophilic solutes is all the more true for hydrophobic macroreticular resins having very small average pore sizes (i.e., ~ 50 Angstroms). There is no driving force for high-surface-tension, hydrophilic solute-containing aqueous solutions to enter pores having diameters on the order of microns, let alone capillaries having diameters of < 100 Angstroms.

Sanders' process clearly is **a process of coating** rather than impregnation. In the very words of the Sanders' disclosure, we read:

- a) aqueous solution is "added dropwise to the resin in a porcelain dish";
- b) "a spatula is used to help **coat** the resin evenly" (emphasis added);
- c) "an air gun is used periodically to **remove excess moisture**" (emphasis added); and
- d) "catalyst is briefly dried with an air gun until it is free-flowing".

All of this emphasizes again and again that the AMBERLITE™ XAD-4 particles are being coated and that the aqueous solution is failing to penetrate. The act of drying periodically with an air gun is necessary to "remove excess moisture". This removal of excess moisture would only be necessary if the water, and its H_2PtCl_6 solute, was not penetrating. Were it penetrating, there would be no excess water to remove.

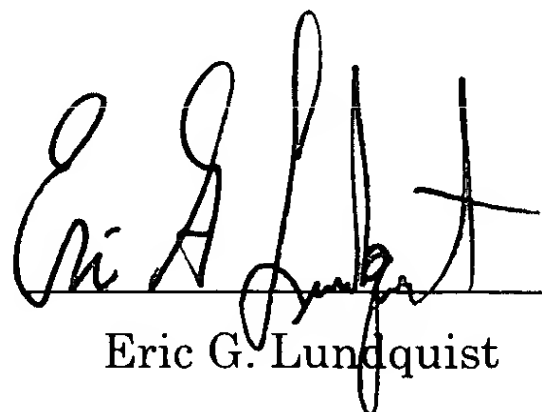
Tellingly, Sanders reaches for the air gun yet again to remove water "until it (the resin / H_2PtCl_6 combination) is free-flowing. It may be strongly and logically inferred from this necessity of evaporating even more water to make the resin free flowing, that water bridging was occurring between particles. (A well known problem for resin handlers.) Water bridging is not usually a handling problem with hard resins like AMBERLITE™ XAD-4 . That enough water bridging between hard particles would still be occurring, even after repeated cycles of air gun drying, indicates clearly that water was not penetrating and, hence, that H_2PtCl_6 was not penetrating.

4. The aqueous H_2PtCl_6 solution did not penetrate the AMBERLITE™ XAD-4 particles. This being the case, it is fair to ask whether any significant

amount of H_2PtCl_6 could have come in contact with double bonds during Sander's preparative procedure. To answer this question, I offer the results of a calculation I have made using standard calculation methods practiced in the Ion Exchange Research Department.

For a 500 micron AMBERLITE™ XAD-4 porous polymer bead, the surface area per gram is 750 m^2/g of which $1.086 \times 10^{-2} \text{ m}^2/\text{g}$ is contributed by the surface of the spherical bead. If AMBERLITE™ XAD-4 contained 2.0 mmol/g of pendant vinyl groups, then only 0.00002 mmol/g of vinyl groups ($\sim 0.001\%$) would be available on the surface for any reaction with H_2PtCl_6 . This amount is clearly insignificant even if a platinum complex were forming, and I find nothing in the literature to suggest that the Pt(IV) based H_2PtCl_6 would complex with a styrene like moiety.

I, Eric G. Lundquist, further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under the United States Code and such willful statements may jeopardize the validity of any patent application or patent issued thereon.



Eric G. Lundquist

7/22/03
Date